REMARKS/ARGUMENTS

Claims 1-20 are pending in this application.

Claims 4, 9, 14, and 19 were objected to for being dependent upon non-elected claims. Applicant has withdrawn Claims 4, 9, 14, and 19 from further consideration. Accordingly, Applicant respectfully requests reconsideration and withdrawal of this objection.

Non-elected Claims 3, 4, 6, 8-10, 13, 14, 16, and 18-20 are dependent upon generic Claims 1 and 11. Accordingly, Applicant respectfully requests that the Examiner rejoin and allow Claims 3, 4, 6, 8-10, 13, 14, 16, and 18-20 when generic Claims 1 and 11 are allowed.

Claims 1, 2, 4, 5, 7, 9, 11, 12, 14, 15, 17, and 19 were rejected under 35 U.S.C. § 101 because the claimed invention allegedly is not supported by either a credible asserted utility or a well established utility.

Particularly, on page 3 of the outstanding Office Action, the Examiner alleged:

> since the 'speakers are vibrated in a frequency range of piston vibration and are in phase with each other' (See claims 1 and 11 and specification page 3, paragraph 3), therefore, since the propagation speed is dependent on the wavelength and frequency of the wave not the amplitude of the wave the wavelength and frequency of the waves will be the same and the wave front produced will be a linear wave and the propagation speed will be the same. Furthermore, wave propagation speed is greatly determined by the medium through which the wave is moving and in the current application the medium is assumed to be air since no other medium is disclosed. Generation of spherical wavefronts can be achieved through input delays of speaker arrays and through physical positioning of speakers in various planes and locations. Therefore, the generation of a pseudo-spherical wavefront as disclosed and claimed by the applicant is not either a credible asserted utility or a well established utility. Applicant respectfully traverses this rejection.

In addition, in the Response to Arguments section on pages 4 and 5 of the outstanding Office Action, the Examiner stated:

> The Examiner submits that the diaphragms of both the main speaker and the subordinate speaker will be vibrated at the same speed when a signal of the same frequency and phase is applied to the diaphragms at the same time. The Examiner understands that since the input amplitude of the subordinate speaker is one half the amplitude of the input amplitude of the main speaker and concludes that this will result in the vibrational displacement of the diaphragms along the axis of vibration to be different. Specifically, the amplitude of the vibration of the subordinate speaker's diaphragm will be less than the amplitude of the vibration of the main speaker's diaphragm but it is not clear that the displacement will be one half. Neither the claims nor the specification provide a clear explanation of how this difference in vibrational amplitude in combination with the difference in diaphragm size will produce a propagation speed of the sound wave produced by the subordinate speaker to be less than a propagation speed of a sound wave produced by the main speaker. Since the propagation rate (speed of the sound wave) is determined by the frequency and phase of the front wave, the Examiner does not agree that a pseudo-spherical wave front will be produced….

Furthermore, in the Advisory Action dated November 16, 2007, the Examiner stated, "The Examiner finds the explanation of the claimed invention persuasive. However, support for the explanation in the original specification cannot be found. The examiner respectfully requests the applicant to map the explanation of the current request for reconsideration to the original specification."

Below, Applicant has reproduced the explanation presented in the Request for Reconsideration filed on November 9, 2007 (which the Examiner indicated was persuasive), and has included a mapping of the explanation to the original specification.

The present invention is directed to vortex suppression. As used in the originally filed specification, the term "pseudo-spherical wave" means pseudo-curvature movements, for example, movements of the speaker diaphragm in which the amplitude is larger at the center and smaller at the edge. These pseudo-curvature movements are achieved in the present invention by changing the amplitudes of the plurality of

speakers which move forward and backward. Regarding vortex suppression, one of ordinary skill in the art would readily recognize that the disturbance (turbulent flow) of the air causing the flat or directional sound wave discussed in the paragraph bridging pages 1 and 2 of the original specification is commonly referred to as a vortex or a vortex ring.

As noted by the Examiner, the propagation speed of sound, namely, the acoustic velocity is constant regardless of the pitch and loudness of the sound. Furthermore, when sound is transmitted through the same medium, such as air, the acoustic velocity remains constant no matter how high the vibration speed or amplitude of the speaker diaphragm is.

Although sound is essentially omnidirectional, sound produced by a speaker typically has directionality due primarily to the back-and-forth movements of the speaker diaphragm. When the speaker diaphragm moves forward and backward, a significant difference in atmospheric pressure is produced around the edges of the speaker diaphragm because air which is pushed by other areas of the speaker diaphragm also covers the edges of the speaker diaphragm. In this situation, vortex rings of air are produced. Because the vortex rings engulf the surrounding air and move in a substantially straight line, subsequent sounds are engulfed and converge so that the airflow becomes directional. It is this problem that the present invention solves. Support for this explanation of what causes the sound waves produced by a conventional cone-shaped diaphragm to be flat or directional is clearly supported in the paragraph bridging pages 1 and 2 of the original specification.

As is well known, under the influence of wind, namely, airflow, sound is changed in view of its direction and longitudinal coverage, and is more susceptible as the air speed increases. The occurrence of the vortexes accelerates the flow rate of the air so as to move in a substantially straight line. Accordingly, sounds converge and become directional. This explains transmittance of planar wave sounds with less loss (i.e., not

greater than about -6 db/octave). This is merely a further explanation of the phenomenon caused by disturbances of the air flow, i.e., vortexes, that would be readily well-known to one of ordinary skill in the art.

The present invention restores the natural omnidirectional sound by preventing the occurrence of vortex rings of the air produced by the back-and-forth movements of the speaker diaphragm and resolving the convergence caused by the vortexes. This advantage of the present invention is clearly set forth in the second full paragraph on page 3 of the original specification. Particularly, the second full paragraph on page 3 of the original specification discloses, "preferred embodiments of the present invention provide a speaker system in which sufficiently large sound volume is ensured, disturbances of the air are prevented, and a mellow and rich tone quality is obtained."

To this end, a speaker in which the speaker diaphragm produces pseudo-curvature movements, instead of back-and-forth movements, prevents vortex rings from occurring, and accordingly, sound is produced without directionality. However, when pseudo-curvature movements are used in a speaker diaphragm in which the edges are fixed, a large amplitude cannot be produced. Therefore, such a speaker is not suitable for base reproduction which requires a relatively large amplitude. The speaker diaphragm which produces pseudo-curvature movements is the dome-type speaker having a semi-spherical diaphragm discussed in the first full paragraph on page 2 of the originally filed specification. Particularly, the first full paragraph on page 2 of the originally filed specification discloses that the semi-spherical diaphragm produces a sound wave that is naturally a spherical wave, but cannot produce large amplitudes due to the outer edge portion of the semi-spherical diaphragm being secured.

Accordingly, the present invention utilizes back-and-forth movements capable of producing large amplitudes and achieves pseudo-curvature movements by which vortex rings are not produced. To this end, the phased arrangement of the plurality of speakers which have different amplitudes in the same phase are provided to moderate

differences in the atmospheric pressure and to prevent air vortexes.

The second full paragraph on page 7 of the original specification discloses:

> **In the speaker system 1, an audio signal input through the audio signal line 14 is applied to the main speaker 11 and the subordinate speaker 12**. Then, when the frequency of the audio signal is within the frequency range of piston vibration of the speakers 11 and 12, **the subordinate speaker 12 is vibrated so as to have the same phase and about one-half the amplitude as the main speaker 11 in the non-vibration area away from the vibration area which is vibrated by the main speaker 11**. In this manner, when the vibration speed of air particles produced by the vibration of a speaker is defined as the propagation speed of a sound wave, the propagation speed of a sound wave produced by the vibration of the subordinate speaker 12 is substantially one-half of the vibration speed of a sound wave produced by the vibration of the main speaker 11. **As a result, as shown by a two-dot chain line, the wave front of the propagation is a pseudo-spherical wave 17, when the speaker system 1 is viewed as a whole**. (emphasis added)

Similarly, the fourth full paragraph on page 8 and the paragraph bridging pages 8 and 9 of the original specification disclose:

> In the speaker system 2 having the above-described construction, an audio signal input through **the audio signal input line 24 is input to the central main speaker 21 with a signal level. However, since the upper and lower speakers 22 are connected in series, an audio signal having substantially one-half of the signal level is input to each of the subordinate speakers 22**.
>
> Accordingly, when the frequency of the input audio signal is in the frequency range of piston vibration of the speakers 21 and 22, **the subordinate speakers 22 vibrate the non-vibration areas of the main speaker 21 so as to be in phase with the main speaker 21 and have about one-half amplitude as the main speaker 21**. In this manner, the propagation speed of sound waves generated by the subordinate speakers 22 is substantially one-half of the propagation speed of a sound wave generated by the main speakers 21. **As a result, as shown by a two-dot chain line in Fig. 4, the speaker system 2 as a whole produces a propagation wave front as a pseudo-spherical wave 27**. (emphasis added)

In view of the foregoing explanation of the present invention, Applicant respectfully submits that (1) the claimed invention is clearly supported by a credible asserted utility and/or a well established utility, i.e., a speaker produces natural, omnidirectional sound; and (2) the explanation of the present invention is fully supported by the original specification.

Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejection of Claims 1, 2, 4, 5, 7, 9, 11, 12, 14, 15, 17, and 19 under 35 U.S.C. § 101.

Claims 1, 2, 4, 5, 7, 9, 11, 12, 14, 15, 17, and 19 were rejected under 35 U.S.C. 112, first paragraph. The Examiner alleged, "since the claimed invention is not supported by either a credible asserted utility or a well established utility for the reasons set forth above, one skilled in the art clearly would not know how to use the claimed invention." Applicant respectfully traverses this rejection.

As set forth above, contrary to the Examiner's allegations, the claimed invention is clearly supported by a credible asserted utility and/or a well established utility. Thus, Applicant respectfully submits that one skilled in the art would certainly know how to use the claimed invention.

Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejection of Claims 1, 2, 4, 5, 7, 9, 11, 12, 14, 15, 17, and 19 under 35 U.S.C. § 112, first paragraph.

In view of the foregoing remarks, Applicant respectfully submits that Claims 1 and 11 are allowable. Claims 2, 5, 7, 9, 12, 15, and 17 depend upon Claims 1 and 11, and are therefore allowable for at least the reasons that Claims 1 and 11 are allowable. In addition, Applicant respectfully requests that the Examiner rejoin and allow non-elected Claims 3, 4, 6, 8-10, 13, 14, 16, and 18-20, which are dependent upon generic Claims 1 and 11.

In view of the foregoing remarks, Applicant respectfully submits that this application is in condition for allowance. Favorable consideration and prompt allowance are solicited.

The Commissioner is authorized to charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-1353.

Respectfully submitted,

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/Christopher A. Bennett #46,710/
Attorneys for Applicant(s)

KEATING & BENNETT, LLP
8180 Greensboro Drive, Suite 850
Tyson's Corner, VA 22102
Telephone: (703) 637-1480
Facsimile: (703) 637-1499

Joseph R. Keating
Registration No. 37,368

Christopher A. Bennett
Registration No. 46,710